SKILLS DEVELOPMENT IN THE KNOWLEDGE-BASED ECONOMY

CONFERENCE SUMMARY REPORT

JUNE 22-23, 1999
MONCTON, NEW BRUNSWICK

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INTRODUCTION

Skills Development in the Knowledge-based Economy was a conference organized and hosted, in the spirit of collaboration, by the Policy Research Secretariat, Industry Canada, Human Resources Development Canada, the Atlantic Provinces Economic Council and the Atlantic Canada Opportunities Agency in Moncton, New Brunswick on June 22-23, 1999. The conference, which brought together various experts in the areas of skills development and the knowledge economy from Canada, the United States and Europe, was designed to examine the current state of employable skills in domestic and international labour markets, matched specifically to the needs of knowledge economy enterprises – i.e., innovative and technology-oriented firms and industries. This document effectively summarizes the conference's key issues and conclusions.

EXECUTIVE SUMMARY

The demand for highly skilled workers is increasing: The conference achieved many points of consensus regarding the role, nature and definition of skills in the knowledge-based economy. Most importantly, the transition toward a global economy based on the acquisition and application of knowledge as the driving force for new processes, businesses and industries depends extensively on progressively higher levels of skills in the labour markets of industrialized nations. In this regard, the demand for workers possessing appropriate and high level skills has increased dramatically over the past several years and will continue to increase over the next decades.

Technical and "soft" skills are both important components of the KBE: Skills were defined in a variety of ways, but largely as belonging to two main sub-sets: technical and/or process-specific; and general and/or soft. In the former category, skill definitions conformed to ready and existing models, including facility with language and/or literacy, numeracy and familiarity with technological – particularly information technology – systems and processes. In the latter category considerable examination identified skills such as communications, creativity, analytical thinking, cognitive ability, adaptability and flexibility and judgement. These general or "soft" skills are widely considered to be at least as important as trainable "hard" skills in determining the eventual success of individuals operating in the knowledge economy.

There is no generalized skills gap in Canada: The conference explored the question as to whether there now exists a "skills gap" which must be addressed in the interests of future productivity gains and competitiveness. Research was presented which employed both existing and available labour market examinations in an attempt to answer the question. In general, the conclusions were that, at present, the Canadian economy possesses the skills it needs in sufficient quantities and at a sufficient level of proficiency to meet its needs for several years to come. However, this does not preclude that there are or will be shortages or skills gaps in some specific sectors or regions of the country.

The gap between the "knows" and "know-nots" is growing: At the same time, however, there is a growing body of evidence to suggest that the gap between the "know" and the "know-nots" is growing, presenting policy makers with a clear and urgent challenge to develop ways to expand labour force participation across under-represented groups in the knowledge economy. This situation reflects the need to highlight the human purpose of the knowledge-based economy which is to ensure a higher quality of life for the general population.

The wage gap may be a constraint for Atlantic Canada: Another real concern for stakeholders in society, particularly in Atlantic Canada, is the threat of a growing "wage gap" related to skills development. Current research clearly indicates that many firms in various regions are either unwilling or unable, for a variety of reasons, to provide competitive compensation to otherwise willing, and skilled, job candidates. This, in turn, is helping to feed a "brain drain" from less industrially robust areas, such as Atlantic Canada, to other parts of the country and/or the United States.

Life-long learning is a critical approach to life skills development: An overarching theme which emerged was the critical importance of a lifelong learning approach to skills development. Such an approach would encourage the growth of a new "ethic" both inside post-secondary institutions and outside in the private training institutions and, fundamentally, in the workforce.

There is a need for regional and cross-sectoral alliances: The creation and use of regional and cross-sectoral alliances and partnerships, among government, industry, the academic community and the research and development community, was strongly emphasized as a means of addressing many, if not all, of the key policy issues and challenges related to skills development in the 21st Century.

1. PLENARY REPORTS

1.1 International Perspectives on Skills Development in the Knowledge-based Economy

Thomas Healy, Principal Administrator, Centre for Educational Research and Innovation, Directorate for Education, Employment, Labour and Social Affairs, Organization for Economic Cooperation and Development:

Knowledge and skills are key factors in economic success and in helping individuals achieve social well-being within their communities, regions and nations. The questions for policy makers to answer are: How do we know which skills are important? Can we speak of general skills that apply in all or most places, contexts and cultures? How is knowledge and competence produced; what are the returns to knowledge and skills? How are skills distributed? What is the pattern of access to learning opportunities for different groups and regions?

What is clear is that knowledge and skills are embodied in individuals, products and research and innovation. As an asset for individuals, knowledge has become increasingly mobile across organizations, sectors and countries. A fundamental feature of societies around the world is the need and capacity of individuals to share and communicate information and to enter into relationships that are based on greater trust and cooperation. Competitive pressures of the global economy notwithstanding, there is a need to foster learning networks that can work to the advantage of whole communities.

The skills that count most in the global village fall under four main categories: communication; numeracy; intra-personal; and inter-personal. Other key skills include facility with information and communications technology; practical cognition; problem-solving abilities; judgement-making capacities; and physical attributes, including dexterity.

The International Adult Literacy Survey (IALS), conducted in over 20 countries has found that nations vary widely with respect to level of skills and their distribution within societies. The findings also suggest that skills are acquired and lost over time. The impacts of varying skill levels can be dramatic both on individuals and broad economies. The research seems clear that low-skilled workers are more likely to endure extended periods of low wage work and unemployment. Highly-skilled workers are more likely, by contrast, to earn more and remain gainfully employed for extended periods. At the same time, there is evidence to suggest that more work needs to be done to increase the demand for skills across a range of occupations and industry sectors.

The IALS clearly indicates that economically and socially advantaged groups tend to do well in literacy scores everywhere. Hence, there is a need to focus on groups at risk of falling even further behind.

Establishing partnerships between government enterprises, social institutions, individuals and community groups is necessary to promote effective "life-long" learning. Skills and competencies are everyone's business, and that insofar as there is a role for public agencies, there is a need to coordinate responses across a broad range of public agency interests.

1.2 Directions and Developments in the United States

Cathleen A. Campbell, Director, International Technology Policy & Programs, Technology Administration, United States Department of Commerce:

The current major competitiveness challenge in the United States, as elsewhere, is ensuring a skilled workforce for a knowledge-based economy. The economy is, increasingly, being driven by technology; and within this framework, information technology is emerging as the main engine. IT's share of the U.S. economy nearly doubled between 1977 and 1998; it contributed one-third of real U.S. economic growth between 1995 and 1997; investments in IT equal 45 per cent of all US business equipment investment.

As such, the IT revolution is driving a sharp demand for highly skilled workers. United States businesses are increasingly concerned about the economy's ability to supply the growing demand for highly-skilled IT workers. It is estimated that more than one million new IT workers will be needed by 2006.

To meet the challenge, the U.S. government is leading a coordinated effort, involving many private sector and public sector representatives, to address the "Digital Dilemma". The agenda of the U.S. Department of Commerce's Office of Technology Policy is to analyze the challenge, establish a dialogue among stakeholders and support best practices and local initiatives. Together with the Departments of Education, Labour and Information Technology – and hundreds of representatives of business, government and academic communities – the challenge is being met with a response in six areas: basic math and science competencies; image of the IT profession; under-represented groups; upgrading the skills of current IT workers; addressing the needs of industry and academia; software productivity and quality.

The strategy involves image-building techniques to convey technology and the technology worker in a more positive light. It is also designed to encourage young people at the very earliest stages of their education to embrace science and technology. It will improve math and science instruction, as well as the participation of under-represented groups.

Retaining incumbent workers requires a "life-long" learning approach, as opposed to meeting immediate business needs. Possible solutions include establishing regional skills alliances; distance learning and telecommuting; and improving the quality of government education programs.

The emphasis must be placed on "life-long" learning, expanded educational and training opportunities and on the use of effective partnerships and regional alliances within government, and among business academia and government. The key competitiveness challenge in the next decade and beyond consists of ensuring an adequate base of skills which is in the national interest.

1.3 National Perspectives (Canada)

Richard Roy, Director, Human Capital and Workplace Studies, Human Development Canada Resources Canada:

The distribution of occupations in Canada requiring progressively greater levels of cognitive abilities are, increasingly, weighted towards the knowledge and management sectors. Human Resources Development Canada's work program on the knowledge-based economy has focused on characterizing the knowledge economy and its significance on skill requirements; assessing the magnitude and nature of the changes over time; establishing some of main factors driving these trends; and examining the implications of these trends, particularly on the distribution of income among different groups of workers.

Between 1971 and 1996, the number of knowledge workers in Canada increased on average 4.1 per cent per annum; the number of management workers rose 7.6 per cent per year over the same period. Research also shows that between 1981 and 1991, employment growth by skill type favoured cognitive and communications abilities over such capacities as gross and fine motor skills. At the same time most knowledge workers have obtained a university degree, compared with a significantly smaller percentage working in the goods and service occupations. Literacy levels among knowledge workers are also measurably higher than their non-knowledge worker counterparts.

Clearly labour force composition in Canada has changed, and continues to change. Globalization and deregulation, perhaps triggered by innovations in technology, may have had a role in the higher incidence of knowledge workers in the economy.

Meanwhile the introduction of the computer has affected some categories of employment more profoundly than others, and in different ways. There is a strong complementarity between knowledge occupations and investment in computers; whereas there is no significant complementarity between service workers and computers.

In the long run, employers use the skills of the workforce and there is no sustained imbalance between the demand and the supply of skills. The quality of the workforce will be a determinant of living standards. In the short run however, it is quite possible that a massive and rapid employment restructuring results in a need for a major investment in training. There remain several questions to answer: Is there a skill gap in Canada? How do we fare relative to other countries? Are we investing enough in the acquisition of skills?

Evidence clearly indicates that the Canadian workforce can meet the needs of the knowledge economy. Despite evidence of an increased frequency of specific labour shortages in certain sectors and occupations in recent years, it does not appear that these shortages are more common today than they were in the past. Apart for a small group of individuals that may not have the minimum skills required in today's labour market, the earning capacity and access to employment for individuals with a post-secondary education has not changed significantly relative to individuals without a post-secondary education. There is therefore no evidence of a generalized skill gap in Canada. There appears no lack of past and current investment in education; the average level of literacy skills among Canadians is high, compared with other developed nations.

Still, the labour market may not yet fully reflect the changes that are occurring. It is possible that a large portion of Canadians are not well endowed in competencies and are at risk of being excluded from participating. The fact that there is no skills gap at the aggregate level does not mean that there won't be one tomorrow.

One policy response is to tighten the link between the distribution of skill and/or competency levels (productivity) and the distribution of compensation. An efficient market for skills will stimulate individuals to develop their competencies. Another key aspect of policy is to make the education system more responsive to the needs of individuals in terms of acquiring lifetime marketable competencies. Finally, another policy area is to maintain a well developed social

insurance system to support "unlucky" individuals who bear the negative consequences of growth.

1.4 Directions and Developments in the Atlantic Region

Elizabeth Beale, President and CEO, Atlantic Provinces Economic Council:

The 1990s has been a difficult decade for Atlantic Canada. Compared with the rest of the country, annual GDP and employment growth have lagged; labour markets remained weak; growth in productivity stalled. By contrast, improved economic conditions in the region has helped reduce unemployment over the last two years of the decade.

Still, the gap in employment between urban and rural areas in Atlantic remains persistently large, with unemployment rates ranging from a low of 7.5 per cent in the densely populated Halifax County, to a high of 28.8 per cent in the sparsely settled South Coast of Newfoundland.

At the same time, regional growth in business services is following the upward trend demonstrated in the national economy. Concurrent to this, a decline in manufacturing employment in Atlantic Canada is indicative of widespread structural change. Business services are growing faster in urbanized areas of the region, while manufacturing declines are evident throughout the economy.

The knowledge economy has clearly created a demand for better educated and skilled workers in Atlantic Canada. Since 1992, a total of 107,000 new jobs for workers with post-secondary educations have been created, while a total of 41,000 jobs for workers without post-secondary educations have been eliminated, representing a net overall gain of 66,000 jobs. The fact also remains that most new knowledge jobs have been clustered in urban areas. So the shift to a knowledge economy has, paradoxically, widened the gap in geographic distribution of job opportunities. This, in turn, has driven net population outflows from rural to urban areas in Atlantic Canada and to other centres in Canada and the United States.

The question as to whether there exists a true "skills gap" in Atlantic Canada is more properly answered by examining the facts for evidence of a "wage gap". The real issue, in fact, seems to be whether Atlantic firms, in general, can – or are willing to – compete for the highly skilled workers this region produces. Moreover, firms that are either unable or unwilling to invest in the skills development of their management and technical workers are less competitive.

The key policy challenge in Atlantic Canada is to develop opportunities at home, particularly in rural areas, that can make competitive use of a higher-skilled labour force. Businesses in Atlantic Canada must be encouraged and supported to invest in skills development for their workers. At the same time, opportunities for knowledge workers must be developed more broadly across the region. A coordinated, policy-oriented approach to these challenges must be adopted by all stakeholders – government, industry, communities, businesses and individuals.

2. REPORTS ON MAJOR ADDRESSES

2.1 Avrim Lazar

Assistant Deputy Minister, Strategic Policy, Human Resources Development Canada:
(Tuesday, June 22 – Luncheon Keynote Address)

What does the knowledge-based economy have to do with people? The economy is here for people; the economy exists for us, not the other way around. We have to realize the human purpose of an economy. And policy is only successful if it realizes its human purpose. Probably the most successful social and health policy is getting somebody a job. There's no conflict between growing the economy and pursuing good social policy. But, we have to remember that not everyone gets jobs.

In terms of reducing misery – the bad things in society – we haven't done a very good job over the past several years. We have done a very good job in negotiating the increase in wealth with the increase of well being in our society. There are other trends. We're finding that in Canada, poverty is becoming entrenched. The culture of poverty in certain urban areas is taking over. Increasingly large slices of the population tend to stay poor for long periods of time. Unfortunately, poverty hasn't been going down in any measure that we expected.

So, the robust economic growth in Canada isn't working for everybody. The growth of the knowledge-based economy has produced more losers than we want. And this doesn't just hurt those who have been left behind. It hurts all of us in a society that emphasizes the importance of community.

Do we have a choice? Is this inevitable in globalization? Can we choose to grow the economy in a way in which we can protect quality of life at home? The answer is yes, we have a choice. We've already chosen not to fall behind in productivity. From an economic perspective, we have made the choice. So, let's translate that now to the social side. The fact is, in this area, we haven't made the choice, partly because we haven't asked the right questions.

How would we do that? At HRDC, we've come up with ways to think about the problem. The federal government's new agenda on skills has five elements: labour market information; decreasing financial barriers for individuals to invest in their skills; working with industry to explain the payback for them to invest in training; focus on special needs groups outside the labour market; and improve community capacity building.

First of all, we have to improve, not necessarily increase, our investment in people, in early childhood and in literacy. We also have to find new ways to support adaptation; in other words, giving support to change. This is no longer an ideological question. There are very few people who argue that it makes more sense to pay people to stay poor. The next thing is supporting inclusion; that is, reaching out to those people for whom traditional programming doesn't work and bringing them back into the mainstream.

2.2 Dan Potter

Chairman and CEO, Knowledge House Publishing Limited:
(Tuesday, June 22 – Dinner Address)

The work of Knowledge House is at the intersection between the Internet and education. I will therefore provide some basic observations on the education system, indicators of where education content might go in the future and different modes of delivery.

One of the main challenges facing skills development in Canada is that approximately 30 per cent of the Canadian workforce have less than a high school diploma. At the upper end of the education scale, the rate of graduation from post-secondary institutions, for people who hold less than one bachelor's degree, is less than 25 per cent. In the U.S., it's 21 per cent. In 150 years, we still haven't succeeded in helping most people obtain the minimum background they need; certainly the minimum they need to function successfully in the knowledge economy. In fact, statistics in the United States show that 65 per cent of all new jobs require a baccalaureate degree.

The issue is not whether there exists a skills gap in our economy. The issue is the knowledge and education gap for those who have to support themselves in this economy. For example, in 1980 in the United States, the average income level for a person with a degree was about 50 per cent higher than for those without a degree. Today, that figure is 111 per cent higher. The issue is the chasm between the "knows" and the "know-nots". At the ultra high level of the economy – the Internet – the value is $300 billion. The compound annual growth rate of the Internet economy is 174 per cent.

Juxtapose this with what we know about educational attainment levels, and what you have is the true measure of a skills gap. What we really have to look at is a continuum for education and life-long learning and a commitment to examine the content of post-secondary degree programs for relevance and importance.

In respect to the Internet economy, we have to ask ourselves what the next layer of jobs are going to be like. They are going to be very high in terms of knowledge content. We have to look seriously at content. Maybe, an idea is to create a bachelor's of knowledge management. Is this just marketing hype? Or is it an emerging body of knowledge that is interdisciplinary – something which connects all of the key disciplines that are needed in the new millennium. Beyond content, what about delivery? We have some excellent examples in Canada of Co-op education.

How are we going to get from a 25 per cent graduate rate to even a 65 per cent rate? Is Co-op education the answer? What about schools at work? We think that work-based learning is an important model to bring the academy into the workplace. We are talking about skills for the new economy. We should be looking at ways to blend real life skills with education at the highest order.

Let's talk about new content. Let's talk about education and philosophy as an inter-disciplinary pursuit. Let's knock down the old boundaries. Let's try new things and new approaches. Workplace learning for me is co-op on steroids.

2.3 Richard Egelton

Senior Vice-President and Deputy Chief Economist, Bank of Montreal:
(Wednesday, June 23 – Luncheon Keynote Address)

The circumstances that produce a "brain drain" in Canada, and its regions, are complex, but they can be charted to produce a reasonably clear picture of the current situation. Cutbacks to education, combined with a regime of high taxes and specific industrial mixes in particular locations conspire to dampen productivity generally.

Low productivity growth, in turn, yields comparatively poor living standards, and poor living standards drives the best and brightest in our country to migrate to places where economic and income opportunities are more bountiful and generous. It is, in essence, a vicious cycle as the brain drain robs our economy and communities of the bank of skilled workers necessary to help fulfill the high productivity potential of the knowledge-based economy.

As current conditions indicate, we can expect to see a further widening in the gap between U.S. and Canadian living standards as the exodus of our "best and brightest" grows over the next several years.

At the same time, it's important to understand the precise nature and dimension of the problem. Although a productivity gap exists between Canada and the United States, absolute productivity growth in Canada has been stronger than in the United States over the past several years; and the decline in living standards relative to the U.S. reflects weaker employment in Canada, generally. And while there is an undeniable brain drain from Canada, it is comparatively small, by historical standards.

Clear policy changes are called for. But we shouldn't formulate policy in a crisis mode. We must rationally approach the issue with the intent to develop and introduce accommodative monetary macro-economic policies. Despite the fact that the U.S. has been operating at above potential, we continue to operate with real interest rates that are higher than those south of the border, while we continue to have inflation in Canada that is well below the mid point of the Bank of Canada's own targets. The number one job is to ensure that our macro-economic policies are more accommodative on the monetary side.

Our national challenge is to bring the Canadian economy up to full potential, and to narrow the productivity gap which now exists. The policy prescription must continue with corporate tax reform, lower marginal tax rates and a reduction in capital gains tax, combined with programs and greater government investment in education and training.

3. CONCURRENT SESSION REPORTS

3.1 Employment Skills in the Knowledge-based Economy

Lars Osberg, Dalhousie University, Halifax - *How Much of Canada's Unemployment is Structural?:*

Structural unemployment can be properly defined as a condition which occurs when workers are unable to fill available jobs because they lack the skills, do not live where work is available, or are unwilling to work at the wage rate offered by the market. During the 1980s, the outward shift in the relationship between the Help-Wanted Index and the unemployment rate raised concerns that structural unemployment was an increasing problem in Canada. That shift, however, has been reversed.

The key idea underlying the concept of structural unemployment is that some unemployed people are unable to accept available jobs for one or more of a variety of reasons. Evidence of the number of these sort of unfilled vacancies in the Canadian economy is notoriously difficult to separate from vacancies caused by normal turnover. In any event, the aggregate vacancy rate in Canada is not high. Available surveys of the Quebec and Canadian labour markets in 1995 and 1996 put the vacancy rate at about 1.14 per cent and 0.75 per cent of the labour force, respectively. Although the high technology sector may have a vacancy rate of as much as 2.8 per cent of employees which is equivalent to 2.2 per cent of the labour force, this sector is small as a proportion of total employment.

The best evidence is that less than one-eighth of the national unemployment rate could be due to structural mismatch between the skills demanded in available jobs and the skills possessed by the unemployed.

Yves Gingras and Richard Roy, Human Resources Development Canada, Ottawa - *Is There a Skills Gap in Canada?:*

We have a skills gap when the qualifications demanded by employers exceed the supply, given the structure of wages and labour-market conditions. The fact that, over the past few years, a growing number of employers have complained about the difficulties they face in finding qualified individuals to hire only points to the normal cyclical phenomenon of recruitment difficulties for all types of workers attributable to a tightening of the labour market – not a sudden, aggregate shortage of skilled labour.

Labour shortages in any modern economy are not intrinsically indicative of labour market malfunctions, or in problems with the education and training systems. In fact, in Canada, government incentives to educate and train compare favourably to other industrialized nations. Moreover, Canada's stock of qualified human capital compares favourably.

This is not to say everything is working smoothly. In today's skills-demanding environment progressively higher educational attainment rates must be encouraged. All Canadian institutions with a connection to the labour market must remain alert and responsive to the needs of the economy and the population. But there is good reason to believe that our institutions will be able to continue adjusting to the new challenges on the horizon.

Fundamentally, analysis of existing empirical data strongly suggests that there is no broad-based shortage of skilled labour in Canada.

Discussants: Robin Neill, University of Prince Edward Island
Daniel Parent, McGill University

3.2 The Knowledge-based Economy

Surendra Gera, Industry Canada - *The Knowledge-based Economy – Trends and Forces:*

Economies and firms are being forced to adopt to a global economic environment that is being transformed by the mutually reinforcing pressures associated with the increasing internationalization of business and the drive for new knowledge. Within firms, and within economies, intellectual capital is being increasingly recognized as a critical asset. Much of the responsibility for adapting to the new economic imperatives falls on individual firms.

But by establishing appropriate policy frameworks, governments can help an economy develop into a knowledge-based one.

There is evidence that investment in information technologies provides firms with productivity benefits, but there is reason to doubt that the possibilities in this area have been fully exploited. As well, the poor performance of small firms needs investigation. Small Canadian firms perform poorly in the generation and adoption of new knowledge. While the performance of outwardly oriented SMEs is superior to that of domestically oriented SMEs, Canadian SMEs, in general, have largely ignored opportunities in export markets. Appropriate government policies should support the design of programs to support basic research; the creation of mechanisms to enhance

the social benefits of cooperation among researchers in different institutional environments; and the development of an intellectual property regime that creates a mix of incentives for both innovation and technology diffusion.

Canada ranks well on many of the general characteristics of a KBE. The Canadian economy is increasingly more trade and investment oriented; its people are highly educated and well-trained; it possesses a well-developed information communications infrastructure. But there is room for improvement – in its commitment to R&D and in the development of patentable innovations; and in the introduction of human resource and organizational innovations needed to fully exploit advanced technologies.

Marie Lavoie and Richard Roy, Human Resources Development Canada - *Employment in the Knowledge-based Economy:*

In effect, the Canadian economy conforms to the knowledge-based economy model in that the employment trends are towards a highly skilled workforce. The knowledge group of occupations is not broadly homogenous: some categories of occupations participate more closely than others in scientific and technological activities.

There has been a significant increase, in Canada, in computer science activities. Engineering occupations, which are at the heart of the process of technological change, have also shown a growth rate higher than that for total employment. Social sciences and humanities constitute 50 per cent of the knowledge group with a rate of growth similar to the knowledge category rate. Applied and pure science actually accounts for a tiny share of the knowledge group of occupations.

Decomposing the change in the structure of employment into three factors – substitution, labour productivity and final demand – it appears that the substitution effect is the most noteworthy, especially for the knowledge and management categories of occupations, and reflects the skill-bias toward these categories of workers. Growth for data and services workers and, to a lesser extent, for social science and humanities, has been mainly stimulated by the productivity lag component. The final sales effect is more modest than the other two affecting data-intensive output and knowledge-intensive output and depressing the demand for goods workers.

Despite the widely recognized role of technological change in an economy, we still know very little about the magnitude and nature of investments for producing these transformations. This is

due to a multitude of factors, but more especially to the differentiated structure of national economies, as well as to the inter-industrial differences in the sources of innovation.

The Canadian economy is becoming, more and more, a knowledge economy. There has been an upward shift among knowledge workers over the past 25 years.

Discussants: Paul Lanoie, École des Hautes études commerciales
Doug Giddings, Human Resources Consultant

3.3 Skills Profile of Selected Occupations: Atlantic Perspective

Mac Weaver, Cornwallis Technology Brokers - *A Skills Profile of Selected Biotechnology Occupations: An Atlantic Canada Perspective*

Bill Collins, Collins Management Consultants: *A Skills Profile of Selected Information Technology Occupations: An Atlantic Canada Perspective*

[These reports will be published separately and made available, under separate cover, by the presenters.]

Discussants: Jacques Rutanga, L'Institut acadien des biotechnologies
Wendy MacDonald, Wendy MacDonald and Associates

3.4 The Regions and Knowledge-based Economy

Raynald Létourneau, Industry Canada - *Canada's Regions and the Knowledge-based Economy:*

Canada's successful transition into a first-class knowledge-based economy will ultimately depend on the progress of our regions. Strong economic fundamentals, a skilled and innovative workforce and an appropriately large technological infrastructure are key to success in the new economy. A clear picture emerges for each part of the country when assessing each region's readiness for future growth in the KBE.

Ontario is well positioned to seize opportunities. It leads, or is among the leaders, with respect to most KBE factors. The Prairie provinces have recently shown significant progress, particularly in terms of the adoption of new technologies, as well as their development of information and

communications technological infrastructure. Quebec compares favourably to its sister provinces in terms of technological infrastructure, but recent growth in investment has been slow, both in terms of human capital and technology. British Columbia's weak innovation is a cause for concern. This is, in part, attributable to its reliance on less innovative industries. While Atlantic Canada is showing clear signs of improvement in most KBE areas, it must become more innovative to fully reap the benefits of the new economy.

Regional readiness for the knowledge-based economy in Canada may vary, but the good news is that there exists a strong commitment and each region is showing significant progress.

Michael Holden, Atlantic Provinces Economic Council - *Report on the Knowledge-based Economy in Atlantic Canada:*

In terms of employment growth, forecasts for the period 1996 to 2007 indicate that knowledge-based industries will dominate in Atlantic Canada. The annual rate of growth is expected to be 2.7 per cent over the next decade – representing something on the order of 21,000 new jobs.

Output from high-knowledge industries is also expected to be strong (about 3.1 per cent per year). In contrast, growth in low-knowledge industries is not expected to change from the current 2.1 per cent per year level. The bad news is that while growth in knowledge-based industries in Atlantic Canada is significant relative to other sectors of the regional economy, such growth has not been able to keep pace with high-knowledge sector growth in other provinces. If high knowledge sectors are to be used as a tool for reducing disparity in Atlantic Canada, this growth rate will have to be improved.

The challenges Atlantic Canada must face include: technology into industry and private enterprise which is slower than the national average; lower than average use of multiple technologies in key industrial sectors, such as secondary manufacturing; the lack of research and development-oriented institutions attuned to the needs of businesses; structural "unwillingness" among Atlantic firms to use certain types of productive technologies; and a net emigration of young and well-educated workers (28,000 individuals, 75 per cent of which came from Newfoundland, between 1991 and 1996).

Policy issues to face include infrastructural development; an ongoing commitment to skills development; greater incentives for firm development; encouraging the development of industrial

"clusters" (knowledge industries that complement one another in close proximity to one another); trade and export development; and the application of e-commerce.

The challenge thus lies in the fact that often the early stages of development are the period when public policy decisions are the most effective, but at the same time when ignorance as to the outcome is greatest. This is the position in which Atlantic Canada currently finds itself. In order to create a positive climate in which to promote growth in high-knowledge sectors, the riskiest but most effective time for appropriate policy action is now.

Discussants: Philippe Massé, Human Resources Development Canada
James MacNiven, Dalhousie University

3.5 Skills Development within Firms

Graham Lowe, University of Alberta - *Barriers and Incentives to Training in the New Economy:*

In order to address problems of training, coordinated policies must be developed to span workplaces, labour markets, education and training institutions. In other words, a very different kind of policy regime than we have now. In respect to barriers and incentives, or more properly defined as weaknesses and strengths, we have to look at organizational influences, labour market trends, worker characteristics, the skills gap and learning organizations.

Fundamentally, if we want to promote what is conventionally known as training, we have to look at providing work environments that encourage continuous learning. What influences the fit or the mismatch between the supply and demand for labour? There's an assumption that underpins HRDC policy to the effect that if you increase the supply of skills, the employers will come. We know that this isn't the case.

It is assumed that employers will train more if they are investing in skills that are specific to their firm needs; except now there is so much pressure on workers to acquire employability skills, that most workers look at specific training programs as steps in broadening their basic set of skills. The distinction, then, between firm general and firm specific skills is becoming muddy. The role of organizational size is also critical. Small firms train far less than large firms, cost being the main obstacle. More to the point, organizational change is very difficult to manage. Bureacratic inertia still remains a fact of life in the private sector.

Labour market trends are extensive. Self-employment accounts for 11 per cent of the workforce; these people are totally on their own when it comes to training. The decline of the standard job means the decline of internal labour markets, in other words core versus contingent workers. Post-war training systems were designed around internal labour markets. Home-based workers face challenges in accessing the resources they need in order to continue to develop their skills.

Skills gap arguments can be seen in different lights. There are many instances where worker skills actually exceed the requirement of the jobs. This goes back to some of the organizational issues discussed. Interestingly, in many organizations, the big high-tech skills are not extensively used.

What are the barriers and incentives to training? A better question is: what are the barriers and incentives to workplace innovation that supports a training environment?

Les Hulett and Charles Davis, innovaQuest - *Knowledge-based Skills Gaps in the Natural Resources Sector in Atlantic Canada:*

Resource-based businesses in Atlantic Canada have adopted increasing amounts of advanced technology over the past two decades in order to maintain a competitive advantage in an increasingly global marketplace – often by focusing on value-added products. This trend has placed increasing emphasis on skills in these sectors.

Resource-based industries are the mainstay of the Atlantic economy. Efforts by government and industry to encourage and support the diversification of the Atlantic economy into high-knowledge-based enterprises has had some effect, but no significant dampening of the central role of traditional industries to jobs and earned incomes in the region.

Atlantic Canada possesses the means to meet the increasing demand for skilled workers in the resource sectors. Many long-established, successful educational and training programs are provided through the region's universities and colleges. Moreover, the post-secondary systems appears to have established a rapport with industry to ensure that the programs are meeting the sectors' needs and interests.

While the concept of sustainable development has been promoted during the past decade, it is now beginning to assume an important role in the management of most resources. It is predicted that sustainability will be a dominant issue for resource managers in the next century. And yet, training in the concepts of sustainable development has not reached those who will be requiring

this knowledge. At this stage, there is a paucity of training programs in this subject in Atlantic Canada. New skills are required to deal with this issue and workers in the resource-based sectors will need to acquire skills, such as communicating with the public and understanding the ecosystems in which they work.

The major skills issue for resource industries is the proportion of the labour force which remains currently low skilled or unskilled. Human resource councils, established in the early 1990s, have worked in all resource sectors to help identify skills needs and barriers to training and skills development. Unfortunately, funding for these councils is being reduced, possibly threatening program delivery.

New skills, and enhanced skills development programs, are needed to train workers on a wide variety of knowledge-related issues critical to the continued competitiveness of Atlantic Canada's resource-based industries.

Discussants: Andrew Sharpe, Centre for the Study of Living Standards
Pierre-Marcel Desjardins, Université de Moncton

3.6 Small and Medium-sized Enterprises

Hans Schuetze, University of British Columbia - *Innovation, Skills and Learning: A Study of Knowledge and Human Resources Management in Small and Medium-Sized Enterprises in British Columbia:*

Standard methods employed to measure innovation are ill-suited to the knowledge-based economy, in general, and to the circumstances of smaller firms, in particular. Standard surveys conceived by the Organization of Economic Cooperation and Development and the European Union fail to recognize the central role of knowledge management. There is a close and symbiotic relationship between technical and organizational innovation, and the importance of human knowledge, skills and learning in the innovation process. Failure to include data in these areas is problematic.

A combination of case study research and surveys is recommended. Rather than measuring the input and output of the innovation process, such an approach would lead to a better understanding of the process itself, its main elements and their interplay. This, in turn, would help governments and other public bodies to better identify those areas where support through public infrastructures and targeted programs are particularly needed and effective.

Such an approach is particularly needed for understanding the innovation process in smaller firms, in particular those in the high-tech and service sectors.

John Baldwin, Statistics Canada - *Innovation, Training and Success:*

Firm turnover that is generated by growth and decline in the industrial population is high. More than 40 per cent of the market share of an average manufacturing industry is transferred from declining firms to growing firms over the course of a decade. The more successful, growing, firms attribute their success to having developed competencies in a wide range of different areas. The common factor that most frequently distinguishes faster from slower growing firms is innovation.

Innovators, in turn, place greater emphasis on a wide range of competencies, in particular an emphasis on skilled labour. What really distinguishes faster growing firms from the slower counterparts is a reliance on formal training programs. More innovative firms need workers with new skills and their requirements are sufficiently firm specific that they adopt individualized training strategies.

This emphasis also varies widely across industries. Goods industries employ training strategies which complement innovation strategies that focus on R&D. In the service sector, the innovation strategy relies less on new capital and more on new skills embodied in the workforce itself.

Here, there is evidence that a training strategy, by itself, has more impact on the success of a firm, probably because it is more likely to be the innovation strategy of the firm.

Discussants: Keith Newton, Carleton University
Caroline Webber, Queen's University

3.7 Educational Institutions

Sid Gilbert, WRNET and University of Guelph - *How Universities are Adjusting to Emerging Skill Needs:*

Human capital is important, but what specific human capital is needed? What specific skills drive a knowledge-based economy? What are the most important skills? Knowledge – the creation of new knowledge is first. The second one is innovation and creative thinking. The

third one is written and oral communications skills. The other one is teamwork – the ability to work in groups. Finally, the creation and application of new technology is fundamental.

What are universities actively doing to meet these emerging skill needs? The first thing is that universities have recognized and acknowledged these skill needs. There's a false dichotomy when we ask whether universities should be training people for the workforce or providing education. That's really a non-issue, because if you look at the skills that are needed, they are needed in all walks of life, not just in the labour market.

Universities are examining advanced skill development, thinking, reasoning and analytical skills. Generally, what education does is open the mind and broaden horizons, which is exactly what you'd expect to need. Creative thinking is crucial, and it is a skill that universities seem to do well at helping to develop among individuals.

Catherine Hajnal, University of New Brunswick - *Incorporating Skill Needs into University Programs – The Case of E-Commerce:*

The outlook for electronic commerce continues to be a projection of growth. Current estimates put worldwide business-to-business-based e-commerce revenues at $268 billion (U.S.) by 2002. Organizations, therefore, are going to continue to look for people who possess e-commerce skills. Given the investment of faculty, technology and the like to develop new educational programs that support this demand, universities are leery to jump. Based on current trends, however, skills for e-commerce will continue to be in demand for the foreseeable future, warranting investment in educational options for developing those skills.

Electronic commerce is not the exclusive domain of any one person in an organization. Individuals often refer to e-commerce projects as those which require people from across an organization to come together to work on initiatives. The skills needed to work on cross-function teams, therefore, are highlighted.

The goal of the electronic commerce program at the Faculty of Business at the University of New Brunswick in Saint John was to be innovative in an area that, at the time, was emerging as a force in businesses. Initial business community input helped establish the program. Ongoing input has been an integral part of further program development.

Essentially, the program strives to position students and their knowledge, skills and abilities, to provide them with a level of technical conversancy. The metaphor with learning a language is purposeful. Students are not expected to be fluent.

A program which creates a three-way connection between arts, business and computer science in a way stronger than simply free electives may hold the future for meeting the skill needs for businesses attempting to derive business value from electronic commerce.

Discussants: Paul A.R. Hobson, Acadia University
Jacob Slonim, Dalhousie University

3.8 Labour Market Profile and Labour Mobility

Lori Whewell, Industry Canada - *Cross Border Flows of Skilled Workers:*

The emergence of the knowledge-based economy has greatly increased the demand for skilled workers in Canada. Employment of workers with a post-secondary education increased by almost 40 per cent between 1990 and 1998. Employment for less educated workers dropped by 12 per cent over the same period. Moreover, Canadians appear to be investing heavily in order to obtain skills. Almost 55 per cent of the labour force has a post-secondary degree or diploma.

Canada also attracts skilled workers from abroad. Recent immigrants account for about 18 per cent of new knowledge entrants to the labour force. But Canada also suffers from a net outflow of skilled Canadians to the United States. Right now, the proportion of knowledge workers among Canadians moving to the U.S. is higher than among Americans moving to Canada. Although a higher proportion of permanent leavers are knowledge workers, the absolute number leaving in the 1990s is not large compared to previous decades. However, evidence suggests that more Canadians are entering the U.S. with temporary visas.

Why do Canadians head south? The tight U.S. labour market provides many opportunities. Higher wage levels across all experience levels also fuels emigration For high-income earners in senior positions, lower U.S. personal income tax rates add to the financial incentive to move.

The loss of skilled workers in Canada poses a significant economic cost, particularly if those lost skills are in high demand back home, and if those leaving are among the country's "best and brightest".

There are reasons to expect that the outflow to the U.S. will increase in the future: U.S. labour markets are tight, and skill shortages exist in certain key occupations; access to the U.S. labour market has eased substantially with the introduction of FTA/NAFTA; there appears to be increased willingness, particularly among young people, to move to the United States.

Carmelita Boivin-Cole, Maritime Provinces Higher Education Commission - *Labour Market Profile* (Post-Graduate Survey):

Sixty-three per cent of the post-secondary students surveyed in the 1996 study in Atlantic Canada came straight out of secondary school. A higher percentage of those entering Masters and Doctorate level programs had spent time in the labour force after obtaining their bachelor degrees. The average age at graduation was 28, with two-thirds of those graduating achieving a higher level of education than their parents. Fifty-three per cent had borrowed money for their education. The average debt had increased by $4,000 over the three-year period between 1993 and 1996.

Traditional gender patterns continue to prevail. Seventy-four per cent and 66 per cent of engineering and information technology graduates, respectively, were men. Eighty-two per cent of health graduates were women. Moreover, the number of women involved in math and science has declined – a serious concern from a public policy perspective.

Graduates, in most cases, indicated that learning how to communicate, and think creatively, analytically and independently were the most important assets earned in their post-secondary education. They were much less likely to indicate that their writing and math skills had improved.

Discussants: Mahmood Iqbal, Conference Board of Canada
Ken Coates, University of New Brunswick - Saint John

3.9 Lifelong Learning in the Knowledge Economy

Frederick Evers, University of Guelph - *The Bases of Competencies – Skills For Lifelong Learning and Employability:*

The agenda of the workplace sets out certain clear challenges. A changing workplace means changing work. The environment in which post-secondary graduates often find themselves is

characterized by less bureaucracy, fewer so-called managers, and greater degree of professional and personal accountability. These realities have helped to change the work itself by increasing amounts of contracted employment and by creating more frequent career options. The results impose a need for combinations of general and specific skills, lifelong, continuous learning, and the use of workplace teams to accomplish goals.

What skills, then, do graduates need to thrive in a changing workplace? In effect, they need to be constantly developing practices for internalizing routines for maximizing their abilities to deal with the uncertainty of an ever-changing environment. These involve a commitment to continuous learning, time management and problem solving abilities.

Communications is key – the ability to interact effectively with a variety of individuals and groups to facilitate gathering, integrating and conveying information in many forms. The ability to manage people and tasks is also emphasized – the ability to accomplish tasks by planning, organizing, coordinating and controlling both people and resources. The ability to mobilize innovation and change is central – conceptualizing, as well as setting in motion, ways of initiating and managing change that involve significant departures from current modes.

Competency-base education and training is not an emphasis on trying to teach skills – rather it is an emphasis on skills development within a learning environment. As content becomes obsolete quickly, individuals must, in effect, learn how to learn.

Daniel Boothby, Human Resources Development Canada - *Literacy Skills and the Knowledge Content of Occupations:*

Occupations in the skilled information group of occupations (management, knowledge and data) usually require a post-secondary education or the equivalent. Most knowledge and data workers have completed a post-secondary education; most managers have a high school education or have completed a post-secondary education.

Knowledge-related activities are now present in all occupational categories; the prevalence of reading and writing activities at work varies widely with the type of activity. Skilled information workers have the highest levels of reading and writing activities, and these activities are an essential element of work in these occupations.

While job-related training is present in all occupational categories, it is most highly concentrated among knowledge workers. Post-secondary graduates with low levels of literacy

skills are far more likely to experience job-education mismatch than other post-secondary graduates. Earnings are also much lower for post-secondary graduates working outside the skilled information sector than for those working in this sector.

Discussant: David Livingstone, University of Toronto

3.10 Attracting and Retaining Knowledge Workers

Steven Ashton, Robertson Surrette Executive Search - *Recruiting, Retaining and Raising Hi-Tech Talent in Atlantic Canada:*

The central question to ask is: What kind of economy do we want? The Atlantic region's economy is blessed by several strengths and hindered by several weaknesses. First the strengths: an educated workforce, improved levels of partnering within industry and government, centres of excellence, proximity to global markets, improving infrastructure, and an attractive lifestyle. The weaknesses include: smaller companies, government operations and branch offices, lagging management skills levels, the typical Atlantic Canadian "inferiority complex", and the fact that the region tends to follow, not set trends.

In order to recruit knowledge workers, Atlantic businesses must focus on providing work that's both challenging and cutting edge. They must move to compensation systems that rewards performance and provides flexible benefits. They must lead in the areas of continuous training and development. And they must provide a dynamic, sophisticated, respectful work environment.

At the same time, the effort to retain employees require somewhat different strategies that focus on making employees feel that they are part of a "winning" organization; that they have the opportunity share in the company's success; and that they have a future in their career.

The region must work in a coordinated fashion to address the obstacles that stand in its way as a location for knowledge work: higher taxes and cost of living than the United States, limited opportunity for career advancement, lower compensation and pay for performance, slower to innovate in management practices, conservative with respect to rewarding risk takers, reduced sense of urgency as players in a global marketplace, and limited degree of applying educational resources.

Cliff Wight, Newfoundland Council of Industry Associations - *Industry Human Resource Requirements Project: Data Analysis Report:*

Almost half of companies responding had difficulty in finding qualified applicants for jobs in their company within the past three years. The technology industry appeared to have faced the greatest challenge in finding qualified applicants. When asked to be specific, Newfoundland Council of Industry Associations companies indicated that computer skills, soft skills, management/business skills, quality management skills and industry-specific skills were most difficult to locate.

Despite this, representatives from post-secondary institutions indicated that most of the skills identified are developed in their curricula. Therefore, the problems could be: matching qualified applicants to job openings; attracting qualified applicants to companies with job openings; the lack of students graduating with appropriate and needed skills in the region; a "brain drain" of qualified applicants from the province; or generally inadequate levels of skill development.

The recommendations stemming from this research are as follows: The NCIA and HRDC must continue to support work experience/skills development programs. Also, companies across the province in every industry must foster a lifelong learning culture in the workplace to ensure employees have the skills needed to be productive in the ever-changing environment of today's information age. Post-secondary institutions must continue to develop curricula that teach appropriate skills and, thus, meet the needs of companies in all industry sectors.

Discussants: John Odenthal, Department of Economic Development and Tourism Nova Scotia
Allister Allen, Aviex Inc.

3.11 Information Technology and Training

David Stager, University of Toronto - *Labour Market Trends for Computer Professionals in Canada:*

Is there a shortage of computer professionals in Canada? The analyzed data does not provide any evidence of any tight labour market conditions. People engaged in these occupations were not found to be working harder or longer than is considered normal at 40 hours per week for full-time workers in Canada.

The empirical indications of a shortage in an occupation might include any of the following: an increase in the occupation's relative earnings or a faster growth of real earnings, a declining unemployment rate compared with the overall rate, complaints of lower quality of services, increase in the rate of return to investment in education and training in the occupation. But generally, the focus is on comparisons of vacancy and unemployment rates, changes in relative earnings, and surveys of employers.

A very rough estimate suggests that there should not be an emerging problem of shortage over the next five to seven years, a very long time in a sector where technology changes so rapidly. Still, much more work is necessary to improve our occupational data and to improve our knowledge of current skill utilization in computer-related industries.

Geoffrey P. Allen, Information Technology Association of Nova Scotia - *Building the IT Workforce:*

The strategic goals for Nova Scotia's Information Technology industry is to become a recognized global leader in information technology infrastructure, application and support. The most significant challenges to this objective include: salary levels, training opportunities, company size, management skills in all areas and building a critical mass within the industry

A recent ITANS survey of IT companies in the province instructively provides a clear picture of the challenges and opportunities before the industry. Respondents to the survey were predominantly small, employing fewer than 20 individuals. Just under nine per cent of IT companies in the province went out of business within the past year. The present skills gap within responding companies is 20 per cent of the requirement. Respondents forecast a growth in demand for new, skilled positions. As well, employers place special emphasis on soft skills, experience and education. As to recruitment, informal methods generally apply; and salaries are considered to be the most significant retention factor.

The tools which must be used to help the IT industry in Nova Scotia achieve its objectives must include a continued investment in the human resources infrastructure, particularly that concerned with education and training. New methods must be developed to improve generalized problem-solving capabilities and focused training on identified technical areas. More work and though must be applied to developing better ways to match IT requirements to available skills.

Discussants: Dan Montgomery, Ernst & Young
Doug Giddings, Human Resources Consultant

3.12 Impacts of Technology on Employment and Skills

Surendra Gera, Wulong Gu and Zhengxi Lin, Industry Canada and Statistics Canada - *Skills and Technology in the Knowledge-based Economy:*

Has technological change led to an increase in demand for skilled workers across Canadian industries over the past two decades? The data indicates that it has. The rise in skill intensity is pervasive across industries. Underlying the overall trend, there is some evidence to suggest higher skill upgrading in the service industries in the years between 1981 and 1994.

The shift towards employment of skilled workers since the beginning of the 1980s has been driven mainly by within-industry skill utilization, rather than between-industry employment shifts. This is true for both manufacturing and services sectors.

R&D capital, patent stocks and age of capital stocks – all of which are technology indicators – are generally found to be strongly correlated with skill intensity. From this, it can be inferred that biased technological change has been a key factor to within-industry skill upgrading across Canadian industries.

Marie Lavoie and Pierre Therrien, Human Resources Development Canada - *The Employment Effects of Computerization:*

Observers have assumed that technological change is the main cause of the increasing wage inequality and of the shift from unskilled to skilled in the labour force. Although a useful exercise, looking at the impact of computerization on the employment structure is like looking at the tip of an iceberg. While the association between workers and physical capital is not significantly different from their relationship with the computer in the decade 1971-81, the impact of computers outweighed the effect of capital in 1986 and 1991. This clearly reflects the significant diffusion of computers from the mid-1980's onwards.

By transforming the structure of jobs, the computer has changed the skills requirements across industries: the knowledge, management and data categories of workers is closely associated with the use of computers while for goods workers the relationship is a substitutive one due to expert systems software. The computer, because of the highly tacit nature of the tasks, does not affect the service category of workers.

As a whole, however, computerization does not appear to be a labour-saving process but rather a labour-using one, which partly explains the shift in the composition of labour over the past two decades.

Discussants: Doug May, Memorial University of Newfoundland
Wade Locke, Memorial University of Newfoundland

4. REPORT ON CLOSING ROUNDTABLE

Chairman: Keith Newton, Carleton University

Participants: **Bill Davis**, MITI (Alliant)
Elizabeth Beale, President and CEO, Atlantic Provinces Economic Council
Roger Harley, Senior Policy Analyst, New Brunswick Department of Labour
Tom Shenstone, Human Resources Development Canada

The participants were asked to respond to the following questions regarding skills development in the knowledge-based economy:

1. What changes in skills and skills mix will be required by the knowledge-based economy?

2. What policies are in place to address these needs?

3. Do we have the knowledge we need to achieve success in the knowledge-based economy?

4. Are there lessons to be gained from the research which was presented at this conference?

5. Where do we go from here?

Bill Davis:

In the IT business, there is a gap in the availability of senior resources compared with junior resources. The universities have done a great job with the latter. That intermediate-to-senior technical and management resource is our biggest need. We also have a problem with out-migration of skilled people. In terms of appropriate policies, the best one we have participated in is an apprenticeship program sponsored by the New Brunswick provincial government. These types of policies allow companies to invest in people. Clearly, we need to invest more in the training of soft skills, particularly for the younger generation. Preparation for the knowledge-based economy must begin very early on in the educational process. As a region, we need to be careful in generating and proliferating statistics that suggest that the Atlantic economy is weaker than elsewhere in the high knowledge sector. There are other factors affecting the knowledge-based economy, than skills sets, and public policy must address those issues as well. We need

better access to markets. The cost of transportation is also prohibitive. As to the lessons learned from the research at this conference, the research needs to be more applicable to real business issues. If I look around the room, I can see maybe two people from the private sector here. I don't know why business doesn't step up to the plate, but to give you what you need, we need research that is applied, and multi-factoral.

Elizabeth Beale:

The central question is whether our country's labour force development strategy is enhancing our ability to take advantage of the knowledge-based economy. Despite all the effort we've put in to discussing this topic, I'm still not really sure how to answer the question. One of the reasons may be that our policy area is so fragmented, divided up between the federal government and the provinces. And we've seen further effort, recently, to devolve program development onto other players. While there are very good reasons for doing this, I wonder if this has compromised our ability to think strategically about what the country really needs. It means that we tend to be more reactive. We react to the skills issue. But our ability to think ahead, from the point of view of someone outside government, this appears to be a real challenge. We need to bring this back together. We need more on the partnership basis between levels of government. We need to better understand what type of strategic initiatives are underway. We also need to do this among provincial governments within this region. There are different ways to get the rest of us outside government involved in the discussion. Two areas where a vacuum exists. The first has to do with small business. There are all sorts of restrictions small businesses deal with when it comes to training. Governments can help by delivering training opportunities more flexibly. But we also need to help small business truly understand the advantages of skills development to their futures; it's not good enough just to inform them. The other area that needs to be addressed is the whole issue of who is out of the labour force for any period of time. Clearly, absence from the labour force erodes skills. The long-term nature of investing in people who have been out of the labour force for any extended period is a fact of life. There is no reason to think that this is an immovable group. It can be brought along, but it takes a long-term, continuous commitment. Equally important is the whole issue of specialization of skills. There is a real issue in this region about how we create niche areas, and how we develop skills that meet these market niches. Some kind of training tax credit to encourage firms to offer a premium on training may be a good idea. These all really come down to how we get our economy up to full potential. This really is the fundamental issue here in Atlantic Canada.

Roger Harley:

Do Canadians have enough commitment to the type of educational quest that is implied in gearing up and participating fully in a knowledge-based economy? I don't think there's any question about this. We have achieved a very high standard internationally. Politically, there's the will. Families are committed. Young people are committed, and even willing to incur the debt. Knowledge-producing industries are the fastest-growing sectors in New Brunswick. Since 1976, our total employment grew by 34 per cent, but during that same period, employment in business services grew by 300 per cent. If we are to keep pace with that kind of change, we have to make sure that our labour force meet the needs, and that our firms are willing to engage those who are able to participate. From 1990 to 1997, New Brunswick gained 35,700 jobs for people with post-secondary educations, and we lost 21,500 for people with Grade 12 or less. It's very clear what we have to do. Teamwork, problem-solving, creativity, flexibility and many of the other soft skills people talk about are not things we can do much about at the post-secondary level. They are things that have to be encouraged and brought out in the K-12 system. We're anticipating that by the year 2009, one-third of working adults will be over 55 years of age. Are there enough people coming up the pipeline? And we're very concerned about that. One thing that's disappointing from the policy standpoint is the lack of women being prepared to participate in the technical side of knowledge-based economy. Enrollment for women in New Brunswick's universities in math and science programs has actually declined in recent years. Our job in government is to try to assist in the match-making of skills to jobs. A couple of things came up in the discussions. One of the things that concerns everybody is whether there is a brain drain, and whether the departure of our "best and brightest" is a permanent condition. It has been said that in Canada, there's a reluctance to pay a premium for people who have higher skills. From an Atlantic perspective, let me assure you the premium is being paid. It's being paid in the United States, or it's being paid in central Canada. It's a cause for concern that over 20 per cent of Atlantic Canada's university graduates leave. What are they precisely trained to do? We need an awful lot of research on this. Interestingly 90-94 per cent of graduates from the community college system in New Brunswick stay. Our employers are great at crying about how they can't get people with certain skills, and yet they are somewhat reticent about offering the kind of compensation packages that are really there in the marketplace. Perhaps, they could combine new training opportunities with expanding their business spheres abroad.

Tom Shenstone:

When we think about skills development, we really have to put Canada in the context of a fairly standard industrialized economy competing internationally in the skilled area of the world market. Our competitors invest in skills, and so do we. Here, we have a combination of market and non-market investment in such things. So, we can expect the pressure to invest to continue. Most Canadians will continue to go on and obtain higher level of skills as they need them, because we live in a country that allows them to do that. We live in a country that, by and large, works. But, of course, some get left behind. So, I conclude, we conclude, that there is no generalized skills gap. The economy uses roughly what it is endowed with, which by the way we created by systematically investing in people in the ways we always have. None of this really tells us where we'd like to go in the future. We'd really like to know, and we'd really like to know now, what would bringing Canada's workforce further up the skills ladder really do? Would it pay off? Three-quarters of the labour force 20 years from now is here already. Maybe we should be thinking about what public investment in adult education is needed. It's puzzling to me that nobody seems to know how the knowledge-based economy really affects industrial structure. A lot of what you hear is about that. It's a much bigger issue than it looks like. Is what is happening creating disposable industries, where whole sectors are no more significant or lasting than the products they produce? If so, does this create disposable workforces that essentially have to reinvent themselves every few years or months? Or does this all still have to do with simply expanding the product producing capacity of entrenched industries? If it is the latter, we can argue that the labour market knows exactly what it should do; if it is the former, then we have to look at the institutional facilitation, that is public policy, that will have to be thought through. Also, what are the costs and benefits to a firm of investing in a skilled workforce? You'll find most don't know. Others are skeptical that skills development actually pays at the bottom line. Where does this take us? We are looking at four basic issues. One is that we have to make future public investment decisions about how much to spend on further skills development. Both levels of government are clearly struggling with this. Number two, there is probably scope to find greater efficiency in our use of skills. Most Canadian firms don't give much credence to work experience outside Canada and the United States. Presumably, that's an inefficiency because a PhD driving a taxi is not efficient. Number three, how do we deal with the risk of marginalization of particular groups? I don't have a ready answer. Finally, how do we go about this? From HRDC's perspective, the current labour market policy world in Canada is a partnership with provincial governments. What we are doing is managing interdependent problems with interdependent solutions.